# Bank charter value, systemic risk and credit reporting systems: Evidence from the Asia-Pacific region

Wahyoe Soedarmono[1*]

Romora Edward Sitorus[1]

Amine Tarazi[2]

*[1] Sampoerna University, Sampoerna School of Business, Mulia Business Park Building D, Jl. MT. Haryono Kav. 58-60, Jakarta 12780, Indonesia*

*[2] Université de Limoges, LAPE, 5 rue Felix Eboue, BP. 3127, 87000 Limoges Cedex, France*

**Abstract**

From a sample of publicly-traded banks in the Asia-Pacific region over the 1998-2012 period, we document that banks with higher charter value are able to insulate themselves from systemic risk by acquiring more capital. Nevertheless, we find that the self-disciplining role of bank charter value is more pronounced for countries with lower depth of credit information sharing. Our results also show that in countries with lower quality of private credit bureaus, higher charter value enhances capitalization, and alleviates systemic risk in banking. Overall, these findings suggest that higher bank charter value might be detrimental to systemic stability for countries where the credit reporting system is of better quality.

**Keywords**: Bank charter value, systemic risk, credit information sharing, Asian banks

**JEL Classification**: G21, G28, D82

[*] Corresponding author.
Email addresses: wahyoe.soedarmono@usbi.ac.id (W. Soedarmono), romora.edward@usbi.ac.id (R.E. Sitorus), amine.tarazi@unilim.fr (A. Tarazi).

Electronic copy available at: http://ssrn.com/abstract=2628003

## 1. Introduction

The relationship between bank competition and financial stability has become a considerable issue across the world, notably in the aftermath of the 2008 global financial crisis (e.g. Beck, 2008; Acharya and Richardson, 2009; Anginer, et al., 2013; Fu et al., 2014). On the one hand, financial deregulation that spurs bank competition is perceived as one of the triggers of financial crises, as banks in a more competitive market tend to behave imprudently in response to a decline in charter value. Such a hypothesis has been acknowledged by a large number of studies in the so-called "charter value" literature (e.g. Marcus, 1984; Keeley, 1990; Matutes and Vives, 1996; Demsetz et al., 1996; Beck et al., 2006; Fungacova et al., 2009; Ariss, 2010; Allen and Gale, 2004). On the other hand, several studies point out that it is higher bank competition that enhances financial stability. Banks in a less competitive market tend to charge higher lending rates, which in turn exacerbates borrowers' moral hazard and bank riskiness. These latter studies are classified in the "competition-stability" literature (e.g. Boyd and De Nicolo, 2005; Boyd et al., 2006; Uhde and Heimeshoff, 2009; Liu et al., 2012; Soedarmono et al., 2013; Fu et al., 2014).

In light of this debate, Berger et al. (2009) highlight that the "charter value" and the "competition-stability" views are not necessarily conflicting hypotheses. While higher bank market power results in an increase in non-performing loans according to the "competition-stability" literature, higher bank market power is also associated with higher capital ratios and lower insolvency risk according to the "charter value" literature. In this context, the adverse impact of bank market power on credit risk can be offset by higher capital ratios and thus, bank insolvency risk could remain unaffected.

In parallel, in spite of the importance of preserving bank-level soundness, the 2008 global financial meltdown also highlights increasing needs to prevent the contagion of bank failures and the buildup of bank systemic risk (Arnold et al., 2013). Although there is no formal definition of bank systemic risk, it is widely accepted that bank systemic risk is associated with the comovement of bank risk taking. For instance, Adrian and Brunnermeier (2011) measure bank systemic risk by computing the comovement of banks' *value at risk* (VaR), while Anginer et al. (2014) consider the comovement of banks' distance-to-default.

Very few studies have looked into the impact of bank competition on systemic risk. Anginer et al. (2014) document from a sample of publicly traded banks across 63 countries that higher bank market power leads to higher systemic risk. In a similar vein, a closely related work by De Nicolo and Kwast (2002) consider the correlations of bank stock returns

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to proxy bank systemic risk to assess the impact of bank consolidations through mergers, but do not explicitly study the effect of market power on systemic risk.

Aside from the adverse impact of bank competition, systemic financial crises could also be caused by asymmetric information problems (Mishkin, 1991; Sau, 2003). For such reasons, a growing literature advocates the importance of credit information sharing to cope with information asymmetry that aggravates bank riskiness (i.e. the "information sharing-stability" literature)[1]. Doublas-Madrid and Minetti (2013) argue that credit information sharing affects bank stability through at least three channels, such as borrowers' moral hazard, banks' moral hazard and adverse selection.

Concerning the first channel, borrowers' moral hazard may decline with better credit information sharing as a disciplining mechanism of borrowers (Jappelli and Pagano, 2002). The second channel builds on Rajan (1992) in which the role of bank moral hazard is particularly highlighted. Specifically, banks may exploit private information about borrowers' quality in order to hold back credit and take rents from borrowers (i.e. "hold-up" problems). In the presence of credit information sharing mechanisms, banks are allowed *ex ante* to share information with other banks about the quality of borrowers. Such mechanisms therefore reduce the market power of banks over borrowers' information, and the "hold-up" problems as part of bank moral hazard could be mitigated. Finally, the third channel relates to the fact that banks could avoid granting loans to riskier borrowers due to the adverse selection problem.

In spite of a growing literature on credit information sharing, there are no studies focused on the link between credit information sharing and bank systemic risk. Prior literature only examines the impact of credit information sharing on bank riskiness and lending. For example, Jappelli and Pagano (2002) show that from a credit bureau survey in 49 countries, countries with public and private credit registries exhibit higher bank lending activities and lower credit risk. Love and Mylenko (2003) differentiate private credit bureaus from public credit registries, and show that the role of credit bureaus in reducing firms' financing constraints is more pronounced for private credit bureaus than public credit registries. Brown et al. (2009) highlight that higher information sharing increases bank loan availability and reduces the cost of intermediation, although such effects are more pronounced for opaque firms, and for countries with a relatively weaker legal system.

[1] Pagaon and Jappelli (1993) specifically shed light on the role of credit reporting system (i.e. credit bureaus) as a proxy of credit information sharing that alleviates information asymmetry, because credit bureaus enable banks and other creditors to routinely share information on the creditworthiness of borrowers.

Eventually, higher credit information sharing reduces bank riskiness, enhances bank profitability and boosts economic growth (Houston et al., 2010).

In relation to the “competition-stability” literature following Boyd and De Nicolo (2005), asymmetric information problems indeed contribute to influence how bank competition affects risk taking. Nevertheless, only Beck et al. (2013) incorporate the role of credit information sharing in affecting the nexus between bank competition and risk taking. They find that greater bank moral hazard in response to fiercer competition plays a crucial role in exacerbating bank default risk, especially for countries with better credit information sharing. In this regard, better credit information sharing can facilitate banks to choose risky loans that generate higher profits, but greater competition drives banks to loosen lending standards (e.g. Ogura, 2006; González and González, 2008). Taken together, stronger competition and better credit information sharing are detrimental to bank stability.

In parallel, another strand of literature shows that information sharing can influence the degree of bank competition. Specifically, Bouckaert and Degryse (2006) provide a theoretical contribution by differentiating “good borrowers” and “bad borrowers” in examining how information sharing through credit registries affects bank competition. In their model, better credit information sharing enables some banks to gain market power by acquiring necessary information from the market, and by not releasing their own credit information to other competitors for strategic reasons. In this sense, better credit information will increase the market power of several banks, which in turn increases the moral hazard of good borrowers. In other words, an increase in the number of bad borrowers in the credit market may in turn affect bank stability.

From the aforementioned studies, credit information sharing and bank competition might arguably be interrelated in affecting bank riskiness and its correlation. This paper contributes to prior literature by examining the joint-impact of bank charter value and credit information sharing on bank systemic risk instead of individual bank risk. Concomitantly, we also examine the joint-impact of bank charter value and credit information sharing on bank capitalization, as the link between bank competition and systemic risk is dependent on how banks manage their capital in response to competition pressures (Berger et al., 2009). We thus reveal how credit information sharing may strengthen or temper the impact of bank charter value on systemic risk and capitalization.

To the best of our knowledge, this paper is the first to establish a bridge between the “competition-stability” and the “information sharing-stability” literature by specifically analyzing its implications on bank systemic risk and capitalization. As further contributions, unlike Anginer et al. (2014) that use the correlation of bank distance-to-default to measure systemic risk, we focus on the correlation of bank idiosyncratic risk and stock returns to proxy systemic risk following previous studies (e.g. De Nicolo and Kwast, 2002, Patro et al., 2013). In order to assess credit information sharing, we consider the role of credit reporting systems (e.g. Pagano and Jappelli, 1993; Jappelli and Pagano, 2002; Houston et al.; 2010; Tsai et al., 2011; Beck et al., 2013). However, instead of merely considering a depth of credit information index as in Beck et al. (2013), we also consider the quality of private credit bureaus and public credit registries,

A sample of publicly traded commercial banks in the Asia-Pacific region is retrieved to tackle the issues raised in this paper. We select the Asia-Pacific region for several reasons. First, the banking sector remains a major source of external financing for private sector in the Asia-Pacific region (Adams, 2008; Moshirian, 2009; Agusman et al., 2008; Soedarmono et al., 2013). Hence, overcoming bank systemic risk is critical to ensure that financial intermediation works properly to spur economic growth without exacerbating financial instability. Second, the Asian banking industry has experienced substantial changes in the aftermath of the 1997 crisis due to bank consolidation and a rapid growth of foreign direct investments in banking (e.g. Moshirian, 2009; Santoso, 2009). Consequently, assessing the issue of bank competition due to a growing consolidation in banking is particularly relevant for the Asia-Pacific region.

Among the existing studies on bank competition and stability in the Asian context Fu et al. (2014) examine how bank competition and concentration affect bank default risk from 14 countries in the Asia-Pacific region. Liu et al. (2012) also examine the link between competition and risk taking in Southeast Asian banks, while Soedarmono et al. (2013) investigate the impact of competition on capital ratios and risk-taking behavior in Asian banks by taking into account the effect of financial crisis and "too-big-to-fail" issues. Some studies also incorporate Asian banks as part of their sample, but the issue of bank systemic risk remains unexplored in the Asian context (e.g. Boyd et al., 2006; Berger et al., 2009; Behr et al., 2010; Schaeck et al., 2009; Ariss, 2010; Schaeck and Cihák, 2012).

To this end, the remainder of this paper is organized as follows. Section 2 describes our data, variables and methodology. Section 3 discusses our empirical findings, while Section 4 provides some robustness checks and Section 5 concludes the paper.

## 2. Data, variables and methodology

### *2.1. Data description*

Our dataset comes from various sources. We focus on publicly traded commercial banks and thus retrieve Asia-Pacific banks' balance-sheet and income statement data over the 1998-2012 period from BankScope Fitch IBCA. Hence, our bank sample consists of 173 publicly traded banks from China (17), Japan (78), Hong Kong (4), South Korea (3), Indonesia (31), Malaysia (3), Philippines (12), Singapore (3), Thailand (10) and Taiwan (12)[2]. Moreover, we also retrieve bank stock price and market index data from Thomson Reuters Datastream.

Meanwhile, data regarding credit reporting systems are collected from the Doing Business database developed by the World Bank. Doing Business 2004-2014 provides data on the country's credit reporting system each year in January from 2003 to 2013. Hence, we consider that such information reflects the condition at the end of each year from 2002 to 2012[3]. Following Tsai et al. (2011), because data on the credit reporting system before 2002 is not available, we use the data in 2002 for the earlier time period (1998-2001). Moreover, we also consider country-specific factors likely to influence bank systemic risk. These include stock market volatility (*MVOL*) and stock market capitalization (*MCAP*) retrieved from the Global Financial Development database provided by the World Bank.

### *2.2. Dependent variables*

This paper considers two dependent variables comprising bank systemic risk and capitalization. Our focus here is to assess whether the impact of bank charter value on systemic risk can be partly explained by the extent to which bank capital ratios are affected by bank charter value.

To measure bank systemic risk, we consider two proxies consisting of the correlation of bank idiosyncratic risk (*SRISK*), and the correlation of bank stock returns (*RCORR*). Moreover, in order to assess bank capitalization, we consider two measures of bank capital ratios commonly used in prior literature on bank capitalization (e.g. Soedarmono et al., 2013; Berger et al., 2009; Schaeck et al., 2012). Specifically, we use the ratio of total equity to total assets (*EQTA*) and the ratio of total capital to total risk-weighted assets (*CAR*).

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[2] The numbers in parentheses represent the number of bank sample for each country.

[3] Tsai et al. (2011) use the similar consideration in dealing with data on the credit reporting system across countries.

With regards to the correlation of bank idiosyncratic risk (*SRISK*), we proceed in three stages. In the first stage, we construct a single-index market model as follows:

$$R_{i,t} = \beta R_{M,t} + \varepsilon_{i,t} \tag{1}$$

$R_{i,t}$ is the stock return of bank *i* at week *t*, while $R_{M,t}$ is the weekly stock market return. We calculate the bank stock return and the market return as follows:

$$R_{i,t} = \log\left(\frac{p_t}{p_{t-1}}\right) \quad R_{M,t} = \log\left(\frac{m_t}{m_{t-1}}\right) \tag{2}$$

From Equation (2), *p* and *m* stand for the bank stock price and the market index, respectively. In the second stage, we estimate Eq. (1) using OLS (ordinary least squares) regression on the basis of a 52-period rolling window. Hence, we consider the standard market model as in Eq. (1) for each bank *i* at week *t* computed from *t* – 51 up to *t*. In the third stage, we retrieve the residual of Eq. (1) and construct an exponentially weighted moving average correlation between the residual of bank *i* ($\varepsilon_{i,t}$) and that of bank *j* ($\varepsilon_{j,t}$) which is calculated from *t* – 51 up to *t* using the following equation:

$$\rho_{ij,t} = \frac{\sum_{s=0}^{k} \lambda^s \varepsilon_{i,t-s} \varepsilon_{j,t-s}}{\left[\left(\sum_{s=0}^{k} \lambda^s \varepsilon_{i,t-s}^2\right)\left(\sum_{s=0}^{k} \lambda^s \varepsilon_{j,t-s}^2\right)\right]^{\frac{1}{2}}} \tag{3}$$

In Eq. (3), we set *k* equal to 51. According to Engle (2002), Equation (3) denotes the exponential smoother which is also the simplest specification for the correlation matrix. As documented by Engle (2002), RiskMetrics also uses the exponential smoother with declining weights based on a parameter $\lambda$. In a moving average correlation, this parameter is necessary to represent that current data has no fixed termination point in the past until it becomes uninformative (Engle, 2002). We follow RiskMetrics and Engle (2002) to set $\lambda = 0.94$. Eventually, $\rho$ is the average weekly correlation between bank *i*'s idiosyncratic risk with the idiosyncratic risk of other banks *j* within each country.

Because our study analyzes the impact of bank charter value on systemic risk based on annual balance-sheet and income statement data, we therefore annualize $\rho$ to obtain the degree of bank systemic risk that varies from one year to another (*SRISK*). Hence, *SRISK* is considered as a measure of annual bank systemic risk. Higher *SRISK* reflects that banks have greater exposure to contagion risk due to other banks' default risk within each country.

Alternatively, we also incorporate another measure of systemic risk based on bank stock returns following De Nicolo and Kwast (2002). We thus construct an exponentially weighted moving average correlation using Eq. (3), but we use bank stock return data instead of the residuals of the standard market model. We denote this specification using *RCORR*, where its interpretation is similar to *SRISK*.

### *2.3. Explanatory variables of interest*

As explanatory variables of interest, we have a measure of bank charter value and several proxies of credit information sharing activities. In order to measure bank charter value that reflects bank market power, we follow Keeley (1990) and Haq and Heaney (2012) using the *Tobin's Q* ratio which is defined as follows:

$$TOBIN = \frac{MVE + BVL}{TA}$$

*MVE* denotes the market value of equity, while *BVL* and *TA* represent the book value of liabilities and total assets, respectively. Because bank charter value represents the market power of banks, banks operating a less competitive market tend to have a higher charter value (*TOBIN*).

Concerning credit information sharing that could alleviate asymmetric information issues within each country, we consider variables representing the quality of the credit reporting system. These include the depth of credit information index (*CRINDEX*), private credit bureau coverage (*PRIVBUR*) and the public credit registry coverage (*PUBREG*). *CRINDEX* ranges from 0 to 6 and measures the degree of credit information available for each country. A higher *CRINDEX* means higher information sharing, because more credit information from credit bureaus is available to support bank lending decisions. In the meantime, *PRIVBUR* and *PUBREG* describe the proportion of individuals and firms listed by private credit bureaus and public credit registries, respectively. Information covered by these credit registries includes repayment history, unpaid debts and credit outstanding. Higher *PRIVBUR* and *PUBREG* are both associated with better information sharing.

### *2.4. Control variables*

Moreover, we introduce a set of control variables that are bank specific and country specific. For bank-specific control variables, we consider the ratio of liquid assets to deposits and short-term funds (*LIQUID*), the cost-to-income ratio (*CTI*), the ratio of total loans to total assets (*LTA*), and the logarithm of bank total assets (*SIZE*). For country-specific variables, we incorporate the growth rate of real gross domestic product (*GROWTH*), the stock market volatility index (*MVOL*), and the ratio of stock market capitalization to GDP (*MCAP*).

### *2.5. Methodology*

We proceed with the analysis in three stages. First, we estimate the degree of bank systemic risk obtained from Eq. (1) to Eq. (3). Second, we investigate the impact of bank charter value on systemic risk and capitalization. In the third stage, we expand the analysis by incorporating the interaction term between *TOBIN* and credit information sharing variables (i.e. *TOBIN* x *CRINDEX; TOBIN* x *PRIVBUR*; or *TOBIN* x *PUBREG*) to examine the combined effect of bank charter value and credit information sharing on bank systemic risk and capitalization.

In terms of the econometric specification, previous studies on bank performance suggest that the current bank performance is affected by its past values because of managerial reasons (Naceur and Kandil, 2009; Naceur and Omran, 2011; Soedarmono and Tarazi, 2013). Arguably, bank systemic risk and capitalization as the dependent variables are also affected by their past values. Hence, the use of a dynamic panel data model that incorporates the past values of the dependent variables (i.e. bank systemic risk or capitalization) as independent variables is particularly relevant. Using a dynamic panel data methodology is also essential to control for possible endogeneity issues documented in the literature on the nexus between bank competition and financial stability (Gonzales, 2005; Schaeck & Cihák, 2007; Uhde and Heimeshoff, 2009; Soedarmono et al., 2011).

In estimating the dynamic panel data model, we follow Arellano and Bover (1995) and Blundell and Bond (1998). In this regard, we use the two-step generalized methods of moments (GMM) estimator or the System GMM. The System GMM is the extension of the Standard GMM by Arellano and Bond (1991), where the level equation is combined with the first-difference equation to create more efficient outputs than the Standard GMM (Baltagi, 2005). By utilizing the System GMM, this study therefore controls for various sources of endogeneity, for instance dynamic, fixed effects and simultaneity in the variables (Pathan and Faff, 2013).

In estimating the System GMM, we consider the finite sample correction by Windmeijer (2005) to provide a robust estimated coefficient. Because our models contain an autoregressive variable, we also perform orthogonal deviation transformations of instruments to control for bank-level fixed effects. Nevertheless, for robustness considerations, we also report the empirical results obtained when using the first-difference transformation of instruments. Eventually, the dynamic panel data models are valid when the *AR(2)* test and *Hansen-J* test are both not significant. When the *AR(2)* test is not rejected, it indicates that no second-order autocorrelation among residuals of first-differenced equation can be found. Similarly, when the *Hansen-J* test is not rejected, it means that the identifying restrictions in our models are valid.

## 3. Empirical results

In Table 1, we provide descriptive statistics of our variables after imposing several restrictions to eliminate possible outliers that may affect our empirical results. Specifically, we exclude *CAR* values that are lower than -1 and higher than 1. We also exclude *LTA* values that are lower than 0 and higher than 1, because *LTA* should range between 0 and 1. In addition to that, we also exclude zero values in all variables used in this study. Moreover, Table 2 presents the correlations of all the variables used to analyze the link between bank charter value, credit information sharing and systemic risk. On the whole, the independent variables used in this study are not strongly correlated. Hence, multicollinearity issues should be less of a concern.

[Insert Table 1 and Table 2 here]

In the next stage, we analyze the impact of bank charter value on systemic risk and capitalization as documented in Table 3. Higher bank charter value (*TOBIN*) is associated with lower systemic risk regardless of whether we use *SRISK* or *RCORR* as a measure of systemic risk. The results also show that banks with higher charter value tend to have higher capital ratios measured by either *EQTA* or *CAR*. These findings suggest that greater charter value enables banks to have higher capital ratios as in Berger et al. (2009). This in turn contributes to alleviate bank systemic risk. Overall, these findings are consistent with the "charter value" hypothesis in which higher bank market power leads to greater financial stability (Fonseca and González, 2010). Our dynamic panel data models are also valid, because the *AR*(2) test and the *Hansen-J* test are not rejected at least at the 5% level.

[Insert Table 3 here]

Moreover, Table 4, Table 5, and Table 6 present our estimation results when we augment our model by introducing the interaction terms between bank charter value (*TOBIN*) and credit information sharing. Credit information sharing is measured by three indicators (*CRINDEX*, *PRIVBUR* and *PUBREG*). In this regard, we assess whether the role of charter value as a self-disciplining factor of banks in affecting systemic risk and capitalization is dependent on the extent to which the country's credit reporting system is of better quality. Overall, our empirical results presented in Table 4, Table 5 and Table 6 are valid, because the AR(2) test and the Hansen-J test remain insignificant at least at the 5 percent level.

In Table 4, we examine the impact of the depth of credit information index (*CRINDEX*) on the link between bank charter value (*TOBIN*), systemic risk (*SRISK* or *RCORR*) and capitalization (*EQTA* or *CAR*). When bank systemic risk proxies become the dependent variables, we document that the negative values of the coefficients of *TOBIN* are higher than the positive values of the coefficients of *TOBIN x CRINDEX*. As such, the self-disciplining role of bank charter value in reducing systemic risk is more pronounced for countries with a lower depth of credit information index. However, we do not find any significant impact of depth of credit information index on the link between bank charter value and capital ratios.

[Insert Table 4 here]

From these findings, bank charter value can substitute the lack of quality of credit reporting systems in mitigating bank systemic risk. Similarly, our results suggest that in countries with better quality of credit reporting system, higher bank charter value can be detrimental to financial stability by increasing bank systemic risk. Such results can be explained by the following reasons. As the depth of credit information index increases, reflecting higher information sharing, bank competition will decrease (Bouckaert and Degryse, 2006). Lower bank competition indicates that the hold-up problems of banks over the borrower information increase and hence, "good borrowers" may become "bad borrowers". Such good borrowers' moral hazard is aggravated when bank charter value also increases considerably, because higher bank charter value can already increase risk taking in the first place as in the "competition-stability" literature.

In Table 5, we specifically consider the influence of the degree of credit information coverage held by private credit bureaus (*PRIVBUR*). We find that the negative impact of charter value on systemic risk is reversed for the countries with higher coverage of credit information held by private credit bureaus (*PRIVBUR*). The positive coefficients of *TOBIN* x *PRIVBUR* outweigh the negative coefficients of *TOBIN*. Phrased differently, the absolute value of *TOBIN* x *PRIVBUR* coefficients are higher than the absolute values of *TOBIN* coefficients. These results therefore suggest that higher bank charter value is detrimental to systemic stability, particularly for countries with better quality of private credit bureaus. Meanwhile, bank charter value can also be a self-disciplining factor of bank risk taking that alleviates systemic risk, but only when the values taken by *PRIVBUR* are quite low.

[Insert Table 5 here]

In contrast, our empirical results in Table 6 show that the degree of credit information coverage held by public registry bureaus (*PUBREG*) does not significantly affect the link between bank charter value (*TOBIN*) and systematic risk (*SRISK* or *RCOR*).

[Insert Table 6 here]

## 4. Robustness checks

In order to further ensure that our results are robust, we also perform several robustness checks[4]. First, we modify Eq. (1) to Eq. (8) by including two control variables reflecting shareholder protection, which is measured by the ease of shareholder suit index (*SHLAW*) and investor protection index (*INVPRO*). This regression is also performed using the two-step GMM estimator following Arellano and Bover (1995) with both orthogonal deviation and first-difference transformation of instruments. Our results regarding the impact of *TOBIN* on bank systemic risk and capitalization as discussed previously are not altered. The model also passes the AR(2) test and the Hansen-J test. Moreover, we also check for the interaction terms between bank charter value (*TOBIN*) and credit information sharing variables (*CRINDEX*, *PRIVBUR* and *PUBREG*), and find that our overall findings remain the same.

The second robustness test is conducted by taking into account the differences in general macroeconomic environments of countries in the Asia-Pacific region. To consider this dimension, we thus incorporate country-specific dummy variables as independent variables in all models. Again, our main empirical findings are not altered.

[4] The results from these sensitivity analyses are not shown in the paper but are available upon request.

## 5. Conclusion

Using a sample of publicly-traded commercial banks in the Asia-Pacific region over the 1998-2012 period, our empirical findings indicate that higher charter value is associated with lower systemic risk and higher capitalization in banking. In this regard, higher bank charter value enables bank to enhance capitalization, which plays an important role in reducing bank systemic risk. Nevertheless, our findings further indicate that in countries with better credit information sharing, especially if private credit bureaus are of better quality, bank charter value no longer can be a self-disciplining factor that alleviates systemic risk. In other words, the impact of bank charter value in reducing systemic risk is more pronounced in the environments with lower credit information sharing and lower quality of private credit bureaus.

Our findings therefore provide several policy implications. While better credit information sharing and the establishment of private credit bureaus might play an essential role in disciplining bank borrowers and mitigating bank riskiness, the role of bank market power should also be taken into close considerations, because higher market power is detrimental to systemic stability when credit information sharing is of better quality. Hence, improving the quality of credit information sharing should therefore be accompanied by reforms to enhance bank competition with the ultimate goals of reducing bank systemic risk.

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## Appendix

**Table 1.** Summary statistics over the 1998-2012 period

| Variables | Description | Mean | Median | Maximum | Minimum | Std. Dev. | Observations |
|---|---|---|---|---|---|---|---|
| *SRISK* | Average correlation of bank idiosyncratic risk | 0.234593 | 0.250023 | 0.681258 | -0.232124 | 0.165418 | 1979 |
| *RCORR* | Average correlation of bank stock returns | 0.393667 | 0.429389 | 0.866503 | -0.113587 | 0.202117 | 1971 |
| *EQTA* | Ratio of total equity to total assets | 0.068389 | 0.05736 | 0.24103 | 0.00045 | 0.036322 | 1823 |
| *CAR* | Ratio of total capital ratio to risk-weighted assets | 0.128066 | 0.1122 | 0.8178 | -0.7756 | 0.078969 | 1749 |
| *TOBIN* | Tobin's Q ratio | 1.015316 | 0.994238 | 1.48956 | 0.867954 | 0.072461 | 1646 |
| *LIQUID* | Ratio of liquid assets to deposits and short-term funds | 0.178939 | 0.09875 | 5.46154 | 0.01578 | 0.235203 | 1867 |
| *CTI* | Cost-to-income ratio | 0.665896 | 0.651 | 8.7358 | 0.19375 | 0.392719 | 1818 |
| *LTA* | Ratio of total loans to total assets | 0.592413 | 0.6333 | 0.90006 | -0.00019 | 0.147488 | 1867 |
| *SIZE* | Logarithm of bank total assets | 16.28897 | 16.6487 | 21.6396 | 10.5768 | 1.807251 | 1867 |
| *GROWTH* | Real growth rate of gross domestic product (GDP) | 0.02672 | 0.021804 | 0.136051 | -0.054188 | 0.034398 | 2093 |
| *MVOL* | Stock market volatility index | 0.244676 | 0.220984 | 0.532069 | 0.077704 | 0.071809 | 2248 |
| *MCAP* | Ratio of stock market capitalization to GDP | 0.713792 | 0.620538 | 5.694619 | 0.140009 | 0.605198 | 2254 |
| *PRIVBUR* | Private credit bureau coverage | 0.424178 | 0.612 | 1 | 0 | 0.356542 | 2595 |
| *PUBREG* | Public credit registries coverage | 0.049291 | 0 | 1 | 0 | 0.131764 | 2595 |
| *CREDINDEX* | Depth of credit information index | 4.724085 | 5 | 6 | 2 | 1.475898 | 2595 |

**Table 2.** Correlation Matrix

| Variables | *SRISK* | *RCORR* | *EQTA* | *CAR* | *TOBIN* | *LIQUID* | *CTI* | *LTA* | *SIZE* |
|---|---|---|---|---|---|---|---|---|---|
| *SRISK* | 1 | | | | | | | | |
| *RCORR* | 0.797288298 | 1 | | | | | | | |
| *EQTA* | -0.375994734 | -0.128339677 | 1 | | | | | | |
| *CAR* | -0.211170404 | -0.046686593 | 0.739954076 | 1 | | | | | |
| *TOBIN* | -0.349364333 | -0.220355995 | 0.264147778 | 0.217863097 | 1 | | | | |
| *LIQUID* | -0.331473661 | -0.223173173 | 0.393791 | 0.365691225 | 0.350464093 | 1 | | | |
| *CTI* | -0.065849281 | -0.106878771 | -0.192348846 | -0.13287864 | -0.002145597 | 0.024734687 | 1 | | |
| *LTA* | 0.183904819 | 0.085384281 | -0.38915349 | -0.491358309 | -0.221221962 | -0.551579388 | -0.055125393 | 1 | |
| *SIZE* | 0.602783401 | 0.616386596 | -0.445953953 | -0.312420901 | -0.189652118 | -0.402277969 | -0.15135459 | 0.225856882 | 1 |
| *GROWTH* | -0.118467161 | 0.030766163 | 0.224848665 | 0.174088609 | 0.278164487 | 0.244099452 | -0.156718973 | -0.260518941 | -0.011704315 |
| *MVOL* | 0.022010242 | 0.041881971 | 0.077587763 | -0.002039745 | 0.055982076 | 0.101608003 | 0.023665646 | -0.042053576 | -0.097016021 |
| *MCAP* | 0.091149938 | 0.234848136 | -0.068451991 | -0.081796789 | 0.04490625 | -0.115327803 | -0.110748432 | 0.095117913 | 0.304521874 |
| *PRIVBUR* | 0.414976721 | 0.286690395 | -0.448539696 | -0.288475832 | -0.439527423 | -0.465378445 | 0.062989591 | 0.429396507 | 0.417571436 |
| *PUBREG* | -0.261155615 | -0.155582005 | 0.266421438 | 0.172763157 | 0.329431073 | 0.232395547 | -0.091846437 | -0.07124379 | -0.150212837 |
| *CREDINDEX* | 0.432822211 | 0.262552094 | -0.491548594 | -0.357964515 | -0.409411139 | -0.518417632 | 0.052227433 | 0.546176804 | 0.488443221 |
| *SHLAW* | 0.223354421 | 0.173813795 | -0.378366899 | -0.288396148 | -0.424803141 | -0.466171655 | 0.047197637 | 0.366816064 | 0.431699125 |
| *INVPRO* | 0.039010617 | 0.146670192 | -0.247049338 | -0.203543007 | -0.174335428 | -0.317516297 | 0.041466427 | 0.414033095 | 0.271708075 |

| Variables | *GROWTH* | *MVOL* | *MCAP* | *PRIVBUR* | *PUBREG* | *CREDINDEX* | *SHLAW* | *INVPRO* |
|---|---|---|---|---|---|---|---|---|
| *GROWTH* | 1 | | | | | | | |
| *MVOL* | -0.143387076 | 1 | | | | | | |
| *MCAP* | -0.010395501 | -0.108839423 | 1 | | | | | |
| *PRIVBUR* | -0.54373537 | -0.251082082 | 0.378711373 | 1 | | | | |
| *PUBREG* | 0.257184342 | 0.012004132 | -0.028184122 | -0.24636465 | 1 | | | |
| *CREDINDEX* | -0.464778334 | -0.254394363 | 0.326974961 | 0.823336539 | -0.053030092 | 1 | | |
| *SHLAW* | -0.526975968 | -0.242013584 | 0.501594254 | 0.720733771 | -0.325007107 | 0.733956517 | 1 | |
| *INVPRO* | -0.430973901 | -0.189220441 | 0.596319216 | 0.618356297 | -0.07065763 | 0.630486933 | 0.60453792 | 1 |

**Table 3.** Bank charter value, systemic risk and capitalization

| | *SRISK* | | *RCOR* | | *EQTA* | | *CAR* | |
|---|---|---|---|---|---|---|---|---|
| | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* |
| *Dep.var (-1)* | 0.62692*** | 0.54443*** | 0.29156*** | 0.26175** | 0.75063*** | 0.60452*** | 0.21351 | 0.10069 |
| | (0.061) | (0.057) | (0.078) | (0.105) | (0.058) | (0.080) | (0.150) | (0.089) |
| ***TOBIN*** | **-0.18942**** | **-0.23843***** | **-0.31394***** | **-0.32356***** | **0.06316**** | **0.06993***** | **0.07569***** | **0.05398*** |
| | (0.074) | (0.079) | (0.085) | (0.092) | (0.027) | (0.026) | (0.027) | (0.033) |
| *TOBIN(-1)* | 0.07988 | 0.06136 | 0.05365 | -0.03942 | -0.01237 | -0.01525 | 0.03184 | 0.07501 |
| | (0.072) | (0.079) | (0.079) | (0.072) | (0.023) | (0.019) | (0.045) | (0.050) |
| *TOBIN(-2)* | -0.06600 | -0.06995 | -0.05826 | -0.03122 | -0.01299 | -0.00810 | -0.07749 | -0.07954* |
| | (0.062) | (0.065) | (0.078) | (0.069) | (0.017) | (0.014) | (0.048) | (0.041) |
| *LIQUID* | -0.15560** | -0.15848** | -0.12548** | -0.12877** | 0.00031 | 0.00128 | 0.01653 | 0.01632 |
| | (0.070) | (0.061) | (0.059) | (0.051) | (0.011) | (0.013) | (0.037) | (0.037) |
| *CTI* | -0.00375 | -0.00077 | -0.00717 | -0.00244 | -0.00459** | -0.00657*** | -0.02493 | -0.01527 |
| | (0.006) | (0.009) | (0.008) | (0.008) | (0.002) | (0.002) | (0.022) | (0.015) |
| *LOAN* | -0.02743 | -0.02986 | -0.04341 | -0.01236 | -0.01190 | -0.01991* | -0.07850*** | -0.09556*** |
| | (0.037) | (0.044) | (0.057) | (0.065) | (0.009) | (0.012) | (0.022) | (0.026) |
| *SIZE* | 0.02217*** | 0.02593*** | 0.05765*** | 0.05731*** | -0.00156** | -0.00227** | -0.00320* | -0.00244 |
| | (0.004) | (0.004) | (0.010) | (0.011) | (0.001) | (0.001) | (0.002) | (0.002) |
| *GROWTH* | -0.19433 | -0.22533 | -0.25815 | -0.07267 | 0.11403*** | 0.12227*** | 0.13452 | 0.12612 |
| | (0.202) | (0.188) | (0.307) | (0.298) | (0.040) | (0.041) | (0.149) | (0.104) |
| *MVOL* | 0.45210** | 0.34903 | 0.62786*** | 0.53531** | -0.06358** | -0.04866 | 0.02306 | 0.04509 |
| | (0.193) | (0.226) | (0.207) | (0.211) | (0.031) | (0.030) | (0.070) | (0.079) |
| *MCAP* | 0.00694 | 0.00892* | 0.01905*** | 0.02302*** | -0.00048 | -0.00063 | -0.00161 | -0.00206 |
| | (0.005) | (0.005) | (0.007) | (0.007) | (0.001) | (0.001) | (0.003) | (0.003) |
| Observations | 1,144 | 1,145 | 1140 | 1140 | 1132 | 1132 | 1,127 | 1127 |
| Number of banks | 135 | 136 | 135 | 135 | 136 | 136 | 136 | 136 |
| p-value of AR(2) | 0.093 | 0.135 | 0.760 | 0.694 | 0.277 | 0.272 | 0.333 | 0.401 |
| p-value of Hansen-J | 0.088 | 0.076 | 0.075 | 0.086 | 0.088 | 0.074 | 0.506 | 0.586 |

**Table 4.** Bank charter value, systemic risk and capitalization: The influence of depth of credit information index

| | *SRISK* | | *RCOR* | | *EQTA* | | *CAR* | |
|---|---|---|---|---|---|---|---|---|
| | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* |
| *Dep.var (-1)* | 0.60044*** | 0.49462*** | 0.28068*** | 0.24446** | 0.69812*** | 0.52957*** | 0.32621* | 0.08744 |
| | (0.065) | (0.063) | (0.077) | (0.106) | (0.076) | (0.097) | (0.185) | (0.069) |
| ***TOBIN*** | **-0.50671**** | **-0.53560*** | **-1.16987***** | **-1.03716***** | **0.09618** | **0.12981*** | **-0.34873** | **-0.30662** |
| | **(0.215)** | **(0.286)** | **(0.378)** | **(0.375)** | **(0.067)** | **(0.068)** | **(0.409)** | **(0.307)** |
| ***TOBIN(-1)*** | **0.05584** | **0.03419** | **0.04587** | **-0.04677** | **-0.01452** | **-0.01706** | **0.08223** | **0.07881** |
| | **(0.071)** | **(0.080)** | **(0.082)** | **(0.075)** | **(0.022)** | **(0.018)** | **(0.085)** | **(0.067)** |
| ***TOBIN(-2)*** | **-0.00601** | **-0.00870** | **-0.03516** | **-0.02013** | **-0.02004** | **-0.01951** | **-0.13534*** | **-0.09477**** |
| | (0.064) | (0.063) | (0.081) | (0.071) | (0.017) | (0.016) | (0.077) | (0.042) |
| ***TOBIN x CRINDEX*** | **0.07791*** | **0.07147** | **0.20347**** | **0.17557**** | **-0.00775** | **-0.01540** | **0.09387** | **0.08039** |
| | (0.049) | (0.062) | (0.085) | (0.086) | (0.014) | (0.014) | (0.089) | (0.064) |
| *LIQUID* | -0.07161 | -0.07809 | -0.12744* | -0.12066** | -0.00769 | -0.01559 | -0.02079 | -0.02041 |
| | (0.060) | (0.054) | (0.070) | (0.055) | (0.011) | (0.012) | (0.016) | (0.025) |
| *CTI* | -0.00890** | -0.00532 | -0.00677 | -0.00325 | -0.00460** | -0.00630*** | -0.01855 | -0.01247 |
| | (0.004) | (0.006) | (0.009) | (0.008) | (0.002) | (0.002) | (0.014) | (0.012) |
| *LOAN* | -0.08710** | -0.11095*** | -0.06735 | -0.04645 | -0.00575 | -0.00689 | -0.04703** | -0.08626*** |
| | (0.036) | (0.042) | (0.065) | (0.074) | (0.009) | (0.011) | (0.021) | (0.028) |
| *SIZE* | 0.01922*** | 0.02350*** | 0.05796*** | 0.05803*** | -0.00137* | -0.00176* | -0.00241 | 0.00024 |
| | (0.004) | (0.004) | (0.011) | (0.012) | (0.001) | (0.001) | (0.002) | (0.002) |
| *GROWTH* | -0.00763 | 0.01892 | -0.33197 | -0.03778 | 0.09371** | 0.08561* | -0.06583 | -0.02755 |
| | (0.181) | (0.168) | (0.290) | (0.292) | (0.043) | (0.044) | (0.120) | (0.086) |
| *MVOL* | 0.00585*** | 0.00502** | 0.00715*** | 0.00591*** | -0.00083*** | -0.00081*** | 0.00106 | 0.00007 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.000) | (0.000) | (0.001) | (0.001) |
| *MCAP* | -0.00128 | 0.00010 | 0.01244* | 0.01654** | 0.00066 | 0.00158 | -0.00348 | -0.00105 |
| | (0.004) | (0.004) | (0.007) | (0.007) | (0.001) | (0.001) | (0.004) | (0.003) |
| *CRINDEX* | -0.05391 | -0.04258 | -0.20304** | -0.17085* | 0.00459 | 0.00912 | -0.10536 | -0.09228 |
| | (0.051) | (0.064) | (0.092) | (0.092) | (0.015) | (0.015) | (0.093) | (0.066) |
| Observations | 1,144 | 1144 | 1140 | 1140 | 1,132 | 1132 | 1127 | 1127 |
| Number of banks | 135 | 135 | 135 | 135 | 136 | 136 | 136 | 136 |
| p-value of AR(2) | 0.083 | 0.145 | 0.731 | 0.703 | 0.290 | 0.277 | 0.343 | 0.234 |
| p-value of Hansen-J | 0.102 | 0.102 | 0.066 | 0.069 | 0.069 | 0.073 | 0.060 | 0.666 |

**Table 5.** Bank charter value, systemic risk and capitalization: The influence of credit information coverage by private credit bureaus

| | *SRISK* | | *RCOR* | | *EQTA* | | *CAR* | |
|---|---|---|---|---|---|---|---|---|
| | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* |
| *Dep.var (-1)* | 0.37144*** | 0.38382*** | 0.32086*** | 0.26174** | 0.59629*** | 0.54145*** | 0.23770 | 0.11688 |
| | (0.057) | (0.062) | (0.080) | (0.106) | (0.100) | (0.106) | (0.164) | (0.093) |
| ***TOBIN*** | **-0.21662*** ** | **-0.18043*** ** | **-0.28297** ** | **-0.33550*** ** | **0.04635* ** | **0.05480** ** | **0.06498** | **0.03428** |
| | **(0.063)** | **(0.068)** | **(0.111)** | **(0.118)** | **(0.025)** | **(0.023)** | **(0.047)** | **(0.054)** |
| ***TOBIN(-1)*** | **0.00637** | **-0.01653** | **0.04090** | **-0.03069** | **-0.00446** | **0.00183** | **0.03333** | **0.07489** |
| | **(0.063)** | **(0.066)** | **(0.086)** | **(0.075)** | **(0.016)** | **(0.013)** | **(0.048)** | **(0.051)** |
| ***TOBIN(-2)*** | **0.01794** | **-0.00966** | **-0.04340** | **-0.01734** | **-0.01491** | **-0.02336** | **-0.08318** | **-0.09574** |
| | (0.050) | (0.047) | (0.084) | (0.070) | (0.015) | (0.011) | (0.052) | (0.047) |
| ***TOBIN x PRIVBUR*** | **0.56833** ** | **0.40149* ** | **0.71060** ** | **0.61169* ** | **-0.10160** ** | **-0.12267*** ** | **-0.06781** | **-0.04044** |
| | (0.265) | (0.285) | (0.305) | (0.349) | (0.049) | (0.045) | (0.076) | (0.088) |
| *LIQUID* | -0.09133** | -0.09836*** | -0.08970* | -0.09536** | -0.00253 | -0.00330 | 0.00165 | 0.00187 |
| | (0.044) | (0.034) | (0.054) | (0.046) | (0.012) | (0.011) | (0.029) | (0.034) |
| *CTI* | -0.01054** | -0.00943* | -0.01157 | -0.00645 | -0.00684** | -0.00528** | -0.02607 | -0.01750 |
| | (0.005) | (0.005) | (0.007) | (0.007) | (0.003) | (0.002) | (0.020) | (0.017) |
| *LOAN* | -0.07219* | -0.06984* | -0.09957* | -0.05744 | -0.01094 | -0.00829 | -0.07781*** | -0.08945*** |
| | (0.040) | (0.039) | (0.056) | (0.068) | (0.010) | (0.011) | (0.028) | (0.027) |
| *SIZE* | 0.02799*** | 0.02767*** | 0.05413*** | 0.05667*** | -0.00089 | -0.00106 | -0.00270 | -0.00166 |
| | (0.005) | (0.005) | (0.011) | (0.011) | (0.001) | (0.001) | (0.002) | (0.002) |
| *GROWTH* | 0.52649*** | 0.37456** | 0.14878 | 0.11650 | 0.00533 | 0.02797 | 0.02318 | 0.00043 |
| | (0.185) | (0.161) | (0.291) | (0.281) | (0.031) | (0.028) | (0.091) | (0.075) |
| *MVOL* | 0.00771*** | 0.00673*** | 0.00715*** | 0.00638*** | -0.00104*** | -0.00093*** | -0.00005 | -0.00006 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.000) | (0.000) | (0.001) | (0.001) |
| *MCAP* | -0.02085*** | -0.01702** | -0.00638 | 0.00258 | 0.00414** | 0.00491*** | 0.00186 | 0.00248 |
| | (0.006) | (0.007) | (0.009) | (0.008) | (0.002) | (0.002) | (0.004) | (0.004) |
| *PRIVBUR* | -0.39757 | -0.25067 | -0.62242** | -0.54399 | 0.08134* | 0.10027** | 0.05001 | 0.01303 |
| | (0.257) | (0.277) | (0.307) | (0.350) | (0.045) | (0.043) | (0.078) | (0.091) |
| Observations | 1144 | 1144 | 1140 | 1140 | 1132 | 1132 | 1,127 | 1127 |
| Number of banks | 135 | 135 | 135 | 135 | 136 | 136 | 136 | 136 |
| p-value of AR(2) | 0.198 | 0.179 | 0.915 | 0.779 | 0.277 | 0.274 | 0.283 | 0.295 |
| p-value of Hansen-J | 0.197 | 0.270 | 0.074 | 0.087 | 0.781 | 0.592 | 0.408 | 0.407 |

**Table 5.** Bank charter value, systemic risk and capitalization: The influence of credit information coverage by public credit registries

| | *SRISK* | | *RCOR* | | *EQTA* | | *CAR* | |
|---|---|---|---|---|---|---|---|---|
| | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* | *Orthogonal Deviation* | *First Difference* |
| *Dep.var (-1)* | 0.62723*** | 0.54603*** | 0.60531*** | 0.47320*** | 0.75794*** | 0.61708*** | 0.21394 | 0.11755 |
| | (0.059) | (0.053) | (0.051) | (0.064) | (0.058) | (0.080) | (0.155) | (0.090) |
| ***TOBIN*** | **-0.14129** | **-0.20234**** | **-0.06128** | **-0.15363** | **0.04966**** | **0.05109**** | **0.06945*** | **0.01255** |
| | **(0.097)** | **(0.102)** | **(0.100)** | **(0.101)** | **(0.024)** | **(0.024)** | **(0.042)** | **(0.057)** |
| ***TOBIN(-1)*** | **0.07865** | **0.05231** | **0.04821** | **-0.00262** | **-0.01128** | **-0.01404** | **0.03760** | **0.08193** |
| | **(0.072)** | **(0.078)** | **(0.089)** | **(0.079)** | **(0.023)** | **(0.020)** | **(0.048)** | **(0.053)** |
| ***TOBIN(-2)*** | **-0.06180** | **-0.05434** | **-0.01120** | **0.02760** | **-0.01359** | **-0.00809** | **-0.07477*** | **-0.07989**** |
| | (0.060) | (0.065) | (0.092) | (0.079) | (0.018) | (0.014) | (0.043) | (0.039) |
| ***TOBIN x PUBREG*** | **-0.09310** | **0.02779** | **0.17622** | **0.33449** | **0.10464** | **0.13757** | **0.09813** | **0.29743** |
| | (0.316) | (0.357) | (0.352) | (0.408) | (0.093) | (0.104) | (0.235) | (0.233) |
| *LIQUID* | -0.15439** | -0.14579** | -0.12189** | -0.10800** | 0.00134 | 0.00294 | 0.01098 | 0.01989 |
| | (0.067) | (0.058) | (0.051) | (0.044) | (0.011) | (0.014) | (0.032) | (0.036) |
| *CTI* | -0.00443 | -0.00269 | -0.01517* | -0.01112 | -0.00453** | -0.00648*** | -0.02178 | -0.01640 |
| | (0.006) | (0.008) | (0.008) | (0.008) | (0.002) | (0.002) | (0.017) | (0.014) |
| *LOAN* | -0.02020 | -0.01483 | -0.02195 | -0.02761 | -0.01164 | -0.01867 | -0.08025*** | -0.09576*** |
| | (0.038) | (0.045) | (0.047) | (0.054) | (0.009) | (0.012) | (0.025) | (0.023) |
| *SIZE* | 0.02110*** | 0.02429*** | 0.02789*** | 0.03615*** | -0.00165** | -0.00238** | -0.00306* | -0.00216 |
| | (0.004) | (0.004) | (0.005) | (0.007) | (0.001) | (0.001) | (0.002) | (0.002) |
| *GROWTH* | -0.03242 | -0.03996 | 0.23702 | 0.36596 | 0.12933*** | 0.13832*** | 0.15277 | 0.10860 |
| | (0.216) | (0.192) | (0.244) | (0.279) | (0.039) | (0.039) | (0.126) | (0.088) |
| *MVOL* | 0.00476** | 0.00413* | 0.00687*** | 0.00745*** | -0.00053* | -0.00034 | 0.00021 | 0.00039 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.000) | (0.000) | (0.001) | (0.001) |
| *MCAP* | 0.00394 | 0.00519 | 0.00250 | 0.00174 | -0.00062 | -0.00051 | -0.00153 | -0.00133 |
| | (0.004) | (0.005) | (0.005) | (0.005) | (0.001) | (0.001) | (0.004) | (0.003) |
| *PUBREG* | 0.00550 | -0.15361 | -0.46447 | -0.73343 | -0.11939 | -0.15280 | -0.10408 | -0.30328 |
| | (0.342) | (0.388) | (0.385) | (0.443) | (0.100) | (0.112) | (0.238) | (0.242) |
| Observations | 1144 | 1144 | 1140 | 1140 | 1,132 | 1132 | 1127 | 1127 |
| Number of banks | 135 | 145 | 135 | 135 | 136 | 136 | 136 | 136 |
| p-value of AR(2) | 0.087 | 0.127 | 0.676 | 0.869 | 0.250 | 0.231 | 0.367 | 0.322 |
| p-value of Hansen-J | 0.056 | 0.023 | 0.114 | 0.155 | 0.055 | 0.088 | 0.431 | 0.564 |